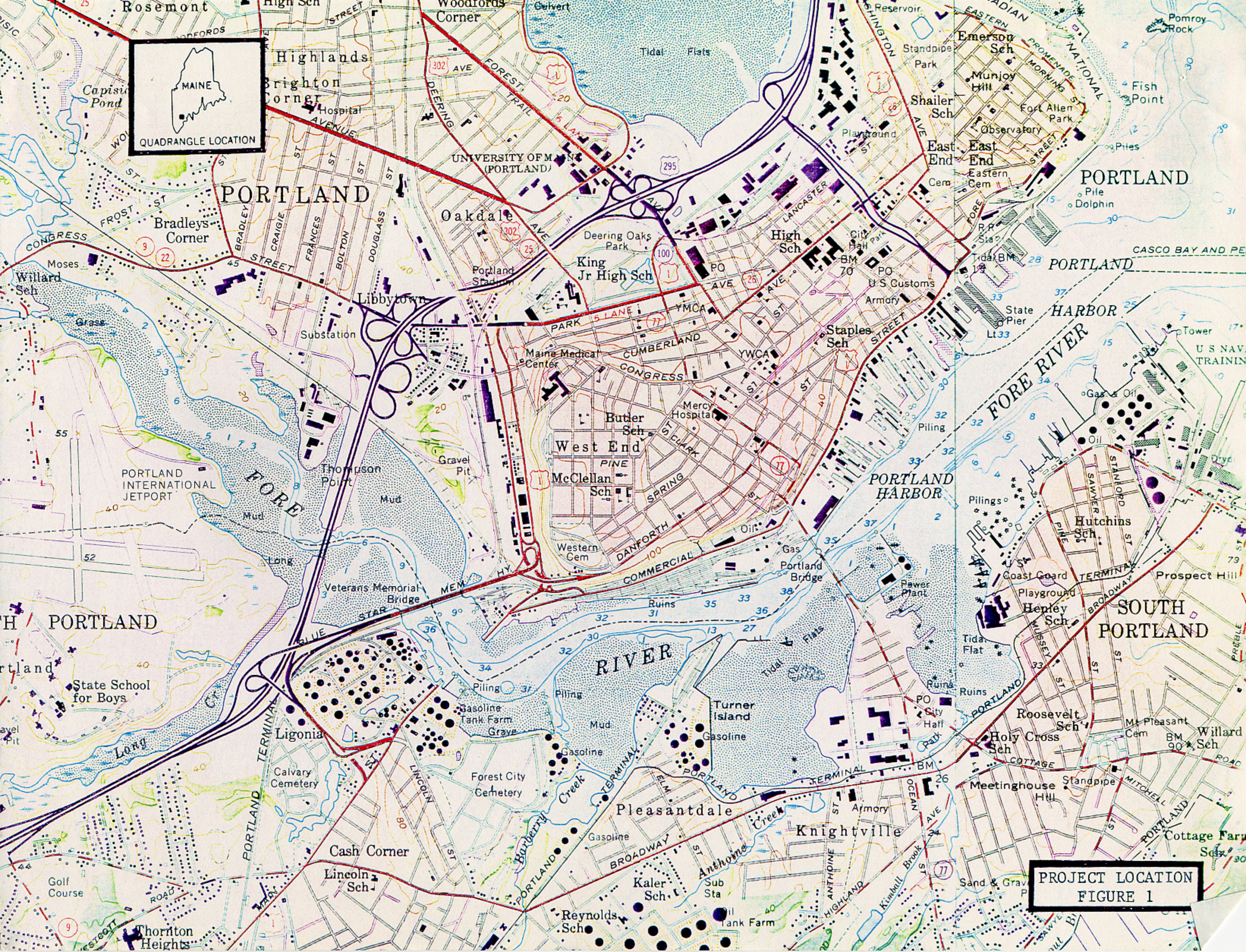
PORTLAND HARBOR
AND THE FORE RIVER
PORTLAND AND SOUTH PORTLAND, MAINE

NAVIGATION IMPROVEMENT STUDY
FEASIBILITY REPORT

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

JUNE 1986



PROJECT LOCATION
FIGURE 1

SYLLABUS

During the oil embargo of the early 1970's the oil terminal operators, who conduct 96% of all commerce on the Fore River Channel, together with the cities of Portland and South Portland successfully petitioned the United States Congress to direct the U.S. Army Corps of Engineers to study possible improvements to the Fore River Channel. It was felt that channel improvements would enable terminal operators to take advantage of the efficiencies of scale in purchasing and storing petroleum products.

The problems of navigation on the Fore River were identified at that time as being a restriction in the navigational opening at the Portland Bridge and limited depth in the Fore River Channel. However, since that time, two things have occurred, namely:

1. The Maine Department of Transportation has made progress towards the planning and design for replacement of the Portland Bridge with a bridge having greater vertical and horizontal clearances and;

2. Oil terminal operators have expressed a willingness and desire to continue operations on a smaller scale using tug assisted barges. This is because of the decline in the oil market as a result of falling prices and a glut in supply.

Due to the lack of economic justification, anticipated modification of the navigation opening and waning support from channel users, it is not considered in the Federal interest to make modifications in the existing Federally constructed and maintained channel in the Fore River.

WATER RESOURCES IMPROVEMENT STUDY
PORTLAND HARBOR
AND THE FORE RIVER
PORTLAND AND SOUTH PORTLAND, MAINE

NAVIGATION IMPROVEMENT
FEASIBILITY REPORT

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

Study Authority

This study of navigation improvements for Portland Harbor/Fore River, Maine has been conducted in compliance with resolutions adopted by the committees on Public Works of the United States Senate and House of Representatives (dated 19 February 1968 and 10 July 1969, respectively).

> RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, that the board of Engineers for Rivers and Harbors is hereby requested to review the reports of the chief of Engineers on Portland Harbor, Maine, published as House Document Number 216, Eighty-seventh Congress, and other pertinent reports, with a view to determining whether any modifications of the recommendations contained therein are advisable at the present time, with particular reference to providing greater project dimensions in the Fore River Channel, together with other appurtenant improvements in order to meet present and anticipated requirements of deep-draft navigation".

(The House of Representatives resolution contains virtually the same wording.)

The congressional resolutions were triggered by local interests, including civic and business interests, who desired to have the Portland Harbor waterways improved. The following study findings are the final response to these resolutions.

Study Area

Portland Harbor is located on the southwest end of Casco Bay in Maine, about 100 miles northeast of Boston, Massachusetts. It is the second largest commercial harbor in New England and the largest in the State of Maine. The harbor is formed by a group of outlying islands and a mainland peninsula divided by the Fore River which makes a natural barrier separating the city of Portland on the north from the city of South Portland on the south.

Ocean navigation extends from a 45-foot entrance channel from Casco Bay to a 35-foot deep channel in the Fore River through the Portland Bridge and as far as the approach to the Veterans Bridge. (See Figure on last page) The Portland Bridge, located across the channel, has a navigation opening for vessel passage. This opening consists of two bascule leaves which are raised to create a maximum horizontal clearance of 98 feet. This clearance restricts the size of vessels which can navigate the upper portion of the Fore River Channel and has been a major constraint to navigation on the upper portion of the channel serving many of the major oil terminals.

Historically, Portland has been the major port on the U.S. seaboard north of Boston for commercial shipping, fishing, railway, shipbuilding and related activities. Portland Harbor is also the receiving port for

southern Maine, the adjacent area of New Hampshire and the Province of Quebec, Canada for petroleum products. A pipeline system carries crude oil from Portland Harbor to refineries in Montreal and another smaller line transports petroleum products to Bangor. All of the refined petroleum terminals and tank farms in the Portland area are located in South Portland.

Previous Studies

A previous release of information in July 1977 on this study considered eight alternatives for meeting the future needs of navigation. These alternatives comprised various combinations for modifying or replacing the existing Portland Bridge whose opening presents a constraint to navigation, deepening of the Fore River Channel and a common petroleum receiving terminal for the oil companies. The economic evaluation of all of these alternatives yielded only a common terminal facility as having a benefit-cost ratio in excess of one and only barely so. The common terminal facility would consist of a pipeline, intermediate storage and a distribution system located outside of the Fore River Channel obviating the need for large vessels to traverse the Federal Channel or transit the Portland Bridge. Under existing authority, the Corps of Engineers can not participate financially in or construct such a facility. The common terminal facility solution was found to be unacceptable to the major petroleum interests in Portland Harbor.

In September 1983, the final report for the Feasibility Study-Fore River Crossing, Portland - South Portland was completed for the Maine Department of Transportation. The study built on the work achieved in the earlier studies with the intent of determining the feasibility and practicality of constructing a replacement structure for the bridge or repairing the existing structure and of identifying the probable impacts upon the social, economic and physical environment. The consultants

identified and quantified benefits associated with bridge reconstruction, among which were those to waterborne transportation. These made up nearly three-fourths of total benefits and were therefore largely responsible for justifying the $58 to $83 million capital investment. The capital investment varies according to the level of upgrading. The benefit-cost ratios in the 1983 study vary between 2.52 and 3.01. The Waterborne commerce benefits as identified in this study consist of three items of cost savings as a result of widening of the navigation opening from 98 to 200 feet between protective fenders:

- net shipping cost savings due to the efficiencies of scale from the increased use of larger vessels, these savings comprise more than 95% of waterborne commerce benefits.

- net reduction in operating cost due to less vessel trips,

- reduction in waterborne accidents.

These waterborne commerce benefits assumed:

- the maintaining of the existing 35-foot deep Fore River Channel,

- beginning with 5,087,000 short tons (ST) in 1985, a 1.5% annual growth rate in petroleum products (other than crude) transported through Portland harbor to the year 2000 and 1% thereafter to 9,000,000 ST in 2035,

- a change in vessel mix from an estimated 62% tankers and 38% barges during the 1976-78 period to 77% and 23% respectively during the 1985-2035 period of study.

- a change in the number of tankers in the vessel mix plying between the Gulf of Mexico and the Caribbean areas and Portland Harbor from 24% during the 1976-78 period to 39% during the period of the analysis.

The primary problem of navigating the Fore River Channel is the restrictive navigation opening at the Portland Bidge. The existing 98 foot horizontal clearance limits passage to smaller tankers (35,000 dead weight tons or less) and tug assisted barges. This results in delays and damages to vessels as they proceed through the bridge. This also results in losses to upstream users since they cannot take advantage of the efficiencies of scale associated with the use of tankers and barges of greater beam.

A secondary navigation concern in the Fore River is the fact that a small number of vessels servicing upstream users draw greater than 35 feet when fully loaded. These vessels incur operational losses as a result of waiting for favorable tides to transit the river. However, the number of these larger vessels is insignificant when compared to the total volume of river traffic.

Commerce (Past and Projected)

Historical Commodity Movements - In New England, Portland Harbor is second only to the Port of Boston in the movement of commodity traffic.

More than 96 percent of all commodity traffic through the harbor is petroleum and petroleum products. The petroleum companies operating here are: British Petroleum, Chevron, Exxon, Global, Gulf, Koch, Mobil, Northeastern Petroleum, Portland Pipe Line Corporation (PPLC) and Texaco. Distribution of petroleum is made by vessels, barges, railroad tank cars, truck and pipeline.

Total traffic through Portland Harbor has grown from 15,509,000 short tons (ST) in 1961 to a peak of 31,679,000 ST in 1971 and then declined to 10,456,000 ST in 1982. These changes in total commodity movements are attributable primarily to changes in crude oil, all of which is imported from foreign countries and transshipped by pipeline to refineries in Montreal. Imports of crude declined by about 75% from 1971 to 1982. Judging from recent information received from PPLC, the decline has continued through 1985. The quantities of other petroleum products (gasoline, residual and distillate fuel, kerosene and jet fuel) have declined by 11% in 1977 and 41% in 1982 as compared to the 1971 level. In general, the declines reflect immediate and lagged softening of demand for petroleum and petroleum products due to price increases, to the oil embargo of the early 1970's and to consequent reductions in inventories.

Virtually all dry bulk and general cargo traffic in the Fore River Channel is serviced by a single user namely, Merrill's Marine Terminal. Total traffic in 1984 was approximately 200,000 short tons. If the channel were deepened and market conditions were favorable, Merrill states that it is highly probable that he would modify his operation to accomodate deeper draft vessels.

Analysis and Projection of Trends - The Portland Pipe Line Corporation (PPLC) imports from foreign sources all of the crude oil entering both the State of Maine and Portland Harbor and transports it by pipeline to the connecting Canadian carrier, the Montreal Pipe Line, which

in turn pumps it to refineries in Montreal. All of the crude is offloaded at PPLC's Pier #2 having a depth below MLW of 48 feet and located at the 45 foot anchorage south of the entrance to the Fore River Channel. Pier #2 is therefore located outside of the Fore River Channel, which is the object of this study. Pier #1 with a depth of berth below MLW of 34 feet is used as a reserve pier. It too is located outside of the Fore River Channel. The dramatic decline in the quantity of crude shipped to Canada reflects Canadian Government policy to displace large portions of foreign crude imported by Montreal refineries with Canadian oil, gas and hydro-electric sources of energy. Factors which could increase Canadian demand for crude through Portland Harbor are a decision to ship any potential eastern Canadian offshore production through Portland to Montreal, and/or if western Canadian oil reserves are proved to be insufficient or are diverted to United States markets.

Given PPLC's current excess capacity at Piers #1 and #2 and its ability to service deeper draft vessels to 45 feet outside of the Fore River Channel, there is no basis at this time for anticipating that the transport of future Canadian demand for crude oil through Portland Harbor would be able to benefit from the deepening of the Fore River Channel.

Merrill's Marine Terminal projected a five fold increase in business from 200,00 ST in 1984 to 1,000,000 ST in 1994. Assuming that this is correct, the average savings as a result of channel deepening for dry bulk and general cargo would only be approximately $0.81 per ton. This would

result in total transport savings of approximately $401,000 annually. These savings are insufficient to justify deepening of the Fore River Channel.

Terminal and Transfer Facilities

Fifty-four piers, wharves and docks are located in the port of Portland. Twenty-three, of these including all of the oil facilities are located in South Portland: Twenty on the south side of the Fore River Channel and three on Casco Bay just south of the river mouth. (See Figure)

Up to now, the primary use of the Portland Harbor facilities has been for receiving and transshipping of petroleum products which represent more than 98% of all commodities handled by the port. Relatively small volumes of general cargo such as pulp, paper products, fish and forest products and bulk cargo including coal, urea and salt are shipped through facilities in Portland Harbor. State, local and private interest are actively promoting general cargo movements through the port including break-bulk, bulk and container cargo.

The decline in oil and oil products demand in the area served by Portland Harbor and consequent decrease in oil shipments to Portland could lead to the consolidation of oil terminals through mergers and acquisitions, the shifting of some of the remaining terminals to more attractive sites and a change in land use for the abandoned facilities to recrea-

tional, residential and other commercial use. Since this report is interested in deep draft vessel traffic, only those piers so concerned will be treated here.

Pier #1 is used as a reserve facility which has not been operating for several years. Pier #2 receives the only crude oil brought into Portland Harbor. The crude is transported by pipeline owned jointly with the Montreal Pipe Line Company to refineries in Montreal.

The frequency of oil tanker traffic into PPLC's facilities has dropped dramatically from 446 vessels in 1974 to 57 vessels in 1983. The capacity of the average vessel has, however, increased from 64,300 DWT and 36.7-foot draft to 89,000 DWT and 37.4-foot draft. Given its location outside of the Fore River Channel, its ability to service tankers of 45 foot draft and that it is presently operative at only about 15% of its 1974 capacity, PPLC will not benefit from a deepening of the Fore River Channel.

Current Vessel Fleet and Future Trends

The discussion here is limited to both self propelled and non-self propelled tanker traffic. Virtually all deep draft vessel traffic entering Portland Harbor carries petroleum products. The number of tankers having a draft of more than 19 feet has declined dramatically by 60% from 771 vessels in 1970 to 307 in 1982. The composition of this

traffic has changed significantly also. Non-self propelled vessels (barges) constituted 7% of this traffic in 1970 and 36% in 1982. The decline in total traffic is primarily attributable to the decreased demand for crude oil in Canada via the Portland Pipe Line Corporation (PPLC) facility and also due to falling demand for gasoline, other distillates, and residual products in the area served by Portland Harbor in Maine and southeastern New Hampshire. PPLC is the sole receiving terminal for crude oil in Portland Harbor and virtually all of it is transported through its Pier #2.

The 1982 level of non-crude carrying tanker traffic was approximately one-half of the 1974 figure and the composition of nonself propelled vessels increased from 15% to 41%. Also of note is a decline in the number of tankers having drafts of more than 34 feet. Although these vessels have had to move into the harbor on the high tides, their numbers are relatively insignificant. Traffic at the Texaco terminal may be indictive of trends since 1981, the most recent year for which official commercial statistics are available for Portland Harbor. Interviews at Texaco reveal that traffic has declined dramatically in the past several years due to the conversion from oil to other energy use. Notably, paper mills have converted to wood by products for their energy needs. Traffic declined from 12 tankers and 123 barges in 1981 to 2 tankers and 40 barges in 1983. Current information reveals that a higher proportion of tanker traffic may reflect lower overseas refining costs. This phenomenon is considered to be a temporary one at the present time.

Discussions with other oil terminal operators confirm the trend towards more barges and intergrated tug and barge units in lieu of tankers in the future for transporting petroleum products, other than crude, into Portland Harbor. The advantages in cost (capital outlay and recurrent costs), lower labor requirements and faster turn around time more than balance the inconveniences of lower operating speeds, less reliability in inclement weather and less maneuverability. The barges currently in use in Portland Harbor, of which the maximum is about 22,000 DWT are fully capable of navigating the present 35-foot channel. Additionally, oil terminal operators forsee a declining, or at best a slow growing, market for their product. During the present oil glut and current price decreases, they prefer to keep inventories low, and for those who are able, to buy on the spot markets in the Boston and New York-New Jersey areas. Under these circumstances, the oil companies favor barges for the transport of their petroleum product.

Twenty-eight vessels comprised of 20 ships and 8 barges serviced general and dry bulk cargo in the Fore River Channel in 1984. Several of the ships carrying scrap and urea had drafts in excess of 35 feet.

~~Economic Analysis~~ ANALYSIS OF PLANS

In principle, the economic justification of the proposed improvements of navigation projects is to be determined by comparing the average annual benefits accruing to the project over its economic lifespan to the equi-

valent average annual costs. The benefits should equal or exceed the costs for the Federal Government to participate in the project.

Benefits and costs are to be compared by putting them on an average annual basis using the interest and amortization rate of 8 5/8% currently applicable to federal projects. The economic life of the project is considered to be 50 years.

Costs of Alternatives

First costs have been estimated for channel deepening alternatives. Two channel widths were considered, 400 feet and 500 feet, following the same alignment as the existing channel. Three depths were considered for each channel width, 38 feet, 41 feet and 45 feet. In addition, costs were estimated for constructing a maneuvering Basin that would provide access to shipping activities along the Portland side in the area of the State Pier. Dredging quantities would range from about 1,000,000 cubic yards to about 5,000,000 cubic yards, depending upon the alternative. First costs include contingencies, engineering and design and supervision and administration. First costs for the various channel deepening alternatives are summarized below.

FORE RIVER/PORTLAND HARBOR, MAINE - NAVIGATION IMPROVEMENT STUDY

FIRST COST AND CONSTRUCTION TIME FOR CHANNEL DEEPENING ALTERNATIVES

(1986 Price Level, in $1,000's)

	400 Foot Channel			500 Foot Channel		
Channel depth (feet)	38	41	45	38	41	45
Construction Time (mo.)	9	16	26	14	23	33
First Costs	5,900	10,700	15,900	9,600	14,400	20,900
Annual Charges	530	950	1,410	850	1,280	1,850
Annual Benefits	insig.	insig.	insig.	insig.	insig.	insig.
Benefit/Cost Ratio	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

	400 Foot Channel & Maneuvering Area			500 Foot Channel & Maneuvering Area		
Channel Depth (feet)	38	41	45	38	41	45
Construction Time (mo.)	10	20	33	16	26	39
First Costs	7,200	12,900	20,800	10,800	16,900	25,100
Annual Costs	640	1,150	1,840	960	1,500	2,220
Annual Benefits	insig.	insig.	insig.	insig.	insig.	insig.
Benefit/Cost Ratio	<1.0	<1.0	<1,0	<1.0	<1.0	<1.0

Eventually annual costs based on a 50 year project life an an interest rate of 8 5/8% would be calculated. In addition to annual first costs, annual costs would include interest during construction and maintenance.

Evaluated

Benefits

The major potential economic benefits for this study have been identified as those due to the use of larger vessels for the transportation of refined petroleum products which comprised more than 96% of all traffic in the Fore River Channel. These could arise though the use of larger tankers to obtain efficiencies of scale and reduced transportation costs. More efficient use of existing vessels would also occur due to reductions in tidal delays and the necessity for multiport operations. Improved safety at the harbor, though not directly quantifiable, would also be a significant benefit. The risk of collisions and/or groundings is partially dependent on the density of traffic. Deepening the channel would enable larger vessels to make fewer total trips, thus decreasing traffic and improving safety.

The analysis of existing data and information and the declarations of oil terminal users indicate a slow growth market for petroleum products in the Portland area and a trend toward the use of more and larger barges for the transportation of petroleum products, other than crude. Barges, which now constitute approximately 50% of all vessels with drafts in excess of 18 feet transiting the Fore River Channel, would not require a deepened channel. There is a great deal of uncertainty in the oil market today. On the one hand, independent petroleum marketers have been increasingly replacing larger producer/refiner companies in the Portland area. These

independent marketers lease space and or have throughput agreements with the oil terminal operators. With respect to the purchase of petroleum, they may operate on contracted agreements as well as on the spot market in the Boston and New York-New Jersey areas. Given the current glut in the petroleum market, they prefer to keep inventories low, buy on the nearby spot markets, and transport their product by barge. On the other hand, although some oil terminal operators see the trend towards the increased use of barges continuing, lower overseas refining costs may reflect increased temporary use of tankers. For certain terminals, the deepening of the Fore River Channel would undoubtedly lessen transportation costs due to reduced tidal delays and multiport operations. However these benefits have not been quantified since they are relatively insignificant and would not of themselves justify navigational improvements.

General and dry bulk traffic, estimated at approximately 200,000 tons in 1984, is relatively insignificant. A detailed analysis earlier in this report demonstrated that a five fold increase in this traffic in ten years would not be sufficient to justify improvements to the Fore River Channel.

Project Use Without and With Improvements

At present, two major potential constraints exist to the improvement of navigation in the Fore River Channel in Portland Harbor: the narrow width (98 feet) of the navigation opening of the Portland Bridge and the -35-foot MLW channel depth. The economic feasibility of replacing or

repairing the Portland Bridge has been addressed in a series of studies, the latest of which was completed in September, 1983. Nearly three-quarters of the total benefits for justifying the alternatives costing between an estimated $58 to 83 million are those due to waterborne transportation on the existing 35-foot deep waterway.

Improvement or replacement of the Portland Bridge is presently being planned. If, as a result, the navigation opening is increased then the U.S. Army Corps of Engineers will dredge the authorized channel through the new bridge opening to appropreate dimensions.

With or without the deepening of the Fore River Channel in Portland Harbor, traffic growth is expected to be moderate and will not exceed historical traffic levels until nearly the twenty-first century. Projections of future traffic in the Fore River Channel consist of petroleum products, other than crude oil. The present low level of cargo traffic and the uncertainties concerning its future growth do not warrant detailed forecasts of general cargo traffic. Crude petroleum is received at the Portland Pipe Line Corporation Pier #2, located outside of the Fore River Channel, and then pumped to refineries in Montreal. In 1982, Fore River Channel traffic comprised 4,021,000 tons of refined petroleum products and 324,000 tons of general cargo. Refined petroleum traffic is projected in this present study to approximate its 1971 level in the year 2000 and reach 10,000,000 short tons in the year 2035. These projections exceed those of the Maine Office of Energy Resources and therefore are

considered to represent a high growth rate future. General cargo traffic of 324,000 short tons in 1982 is relatively insignificant at present. Although the Maine Department of Transportation and Merrill's Marine Terminal are actively pursuing studies and marketing strategies to create a container feeder service and to attract bulk and break-bulk traffic between Portland harbor and other American and Canadian ports, no rational basis exists at present for projecting large volumes of dry cargo traffic of a magnitude and a nature to require deepening of the Fore River Channel. A container feeder facility would not require a deepened harbor.

Interviews with the oil terminal and general cargo users of the Fore River Channel reveal that virtually none of them at present would take advantage of the deepening of the Fore River Channel by co-investing in their piers and berthing facilities in order to take advantage of the economics of scale for transporting their products on larger vessels. With respect to petroleum traffic, the trend is clearly towards more and larger barges (which do not require channel deepening) and a decline in the number of tankers. Tankers having drafts of more than 35 feet would necessitate entry to the harbor on the tides or require reduction of draft by earlier offloading at other ports.

The decline in oil and oil products' demand in the area serviced by Portland Harbor and the consequent decrease in oil shipments through Portland could lead to a consolidation of oil terminals through mergers and acquisitions, the shifting of some of the remaining terminals to more

attractive sites and a change in land use for the abandoned facilities to recreational, residential, and commercial use. The consolidation of oil terminals may make it feasible for the remaining oil terminals with a larger share of the market to consider larger bulk shipments and possibly use larger tankers. This eventuality is not foreseeable at this time.

Merrill's Marine Terminal services virtually all of the dry bulk and general cargo traffic in the Fore River Channel. If the channel were deepened to 38 feet below MLW, for example, and market conditions were favorable, Merrill states that it is highly probable that he would modify his berth and access channel and operations in order to accommodate deeper draft vessels. Based on an increase of this traffic to 1,000,000 ST in 1994, the analysis presented earlier in this report indicates that the improvements to the Fore River Channel would not be economically justified.

~~Findings~~ CONCLUSIONS

The following findings argue against the deepening of the Fore River Channel at this time:

- With the exception of Merrill's Marine Terminal, present and potential users would not modify their operations nor co-invest in improving their piers and berthing facilities so as to take advantage of the deepening of the Fore River Channel. The projected transport savings

at Merrill's Marine Terminal would not be sufficient to justify deepening of the Fore River Channel to 38 feet below MLW.

- Dry bulk and general cargo traffic was approximately 200,000 ST in 1984. Attempts by promoters and terminal operators to extend Portland Harbor's zone of influence to northern Maine, and to the American and Canadian mid-west are noteworthy. It is premature to predict whether certain competitive disadvantages can be over come to attract traffic from other ports to Portland.

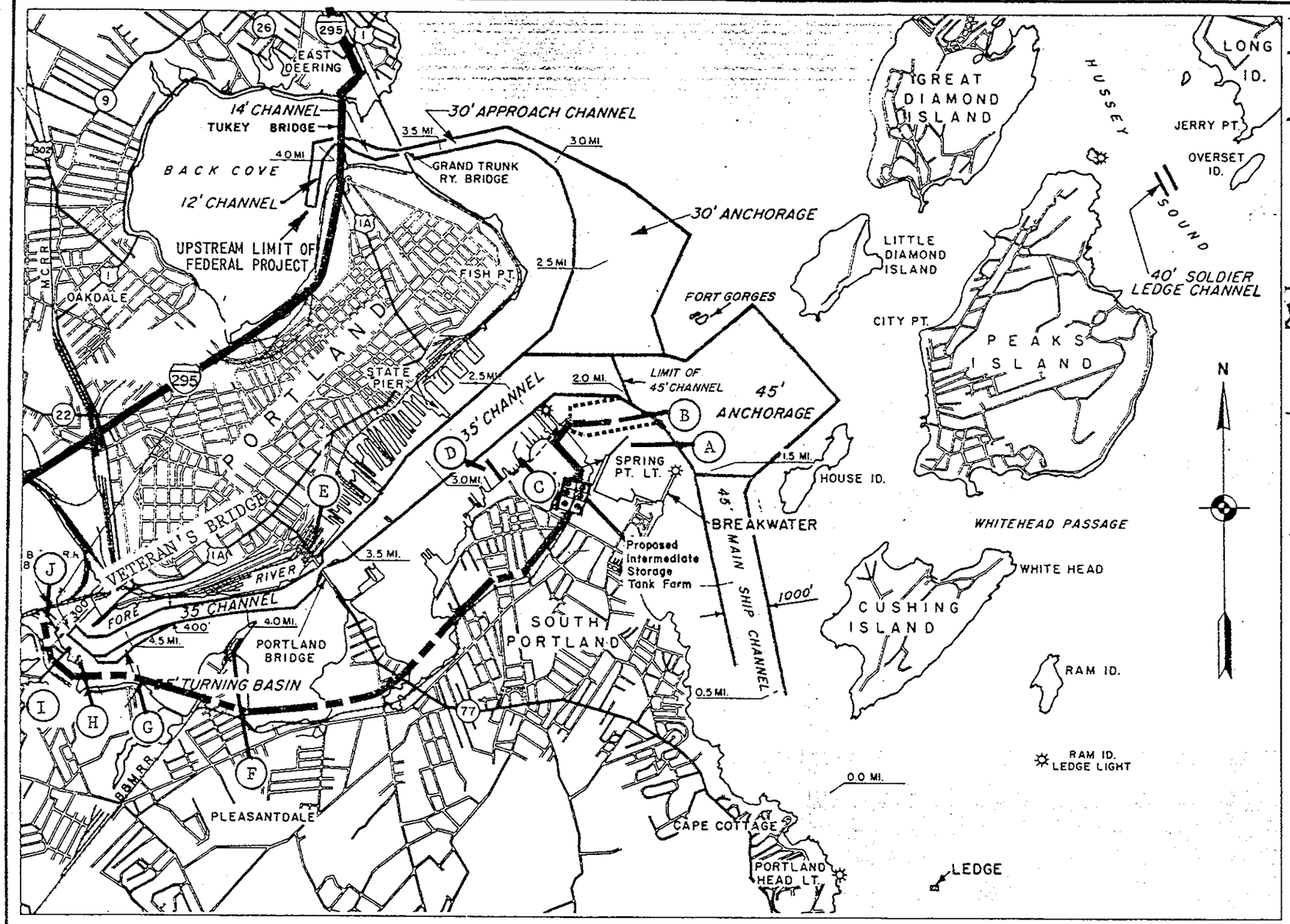
- Only moderate increases in refined petroleum traffic are predicted through the Fore River Channel in the next 50 years. The trend at this time is clearly to the use of more and larger barges for the transport of refined products. These do not require channel deepening.

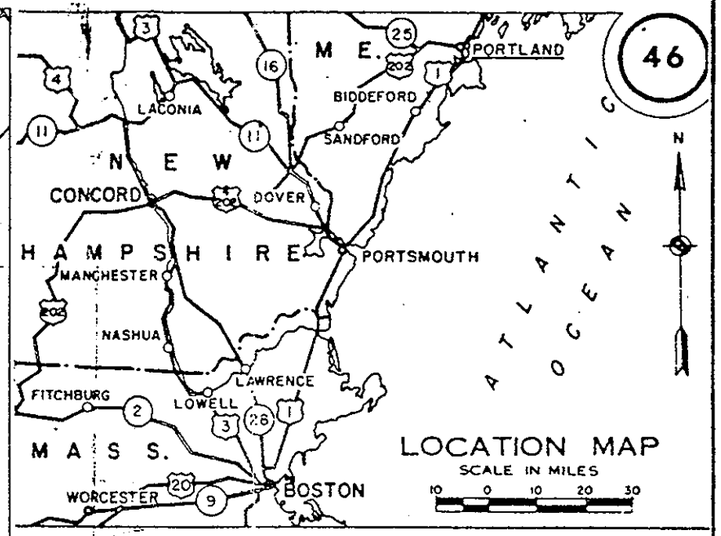
- Crude petroleum traffic does not use the Fore River Channel. If future Canadian offshore oil were to be shipped though Portland Harbor, it is not likely that the Fore River Channel would be used. Crude would probably be transported through the Portland Pipe Line Corporation's Pier #2 located outside of the Fore River Channel.

- Some vessels having drafts deeper than 35 feet will experience tidal delays or be otherwise inconvenienced (deballasting, multi-port operations, etc.) by the present 35-foot depth of the Fore River Channel. The number of these vessels is not significant and could not itself justify the deepening of the channel.

RECOMMENDATION

In light of these findings, it is recommended that the study be terminated and that no project improvements by the U.S. Army Corps of Engineers be considered for Portland Harobr/Fore River Maine at this time.





BRIDGE CLEARANCES

PORTLAND HARBOR (BASCULE)
Hor. 100 ft.
Vert. 31 ft. M.H.W.

TUKEY BRIDGE
HOR. 100 FT.
VERT. 30 FT. M.H.W.

DUAL R.R. & HY. FIXED BRIDGE
HOR. 99 FT.
VERT. 10 FT. M.H.W.

Location		Location	
A	Portland Pipeline Pier #2	G	Amoco Oil Co. Wharf
B	Possible Common Terminal (2 Berths)	H	Mobil Oil Co. Dock also serves Northeast Pet. Co. & Gibbs/BP Oil
C	Chevron Oil Co. Dock	I	Northeast Petroleum Wharf
D	Portland Pipeline Pier #1	J	Bancroft and Martin Docks also serves Exxon, Getty, Gulf, Shell, and Gibbs/ BP Oil Companies
E	Portland Bridge Horiz. Opening 98 ft.		
F	Texaco Oil Co. Wharf		

WATER RESOURCES IMPROVEMENT STUDY
FORE RIVER
PORTLAND HARBOR, MAINE
EXISTING FEDERAL PROJECT AND TERMINAL FACILITIES

IN 1 SHEET — SCALE IN FEET
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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.